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General Summary*

An International Workshop/Conference under the joint chairmanship of Drs. Lars Friberg of the Karolinska Institute and Norton Nelson of New York University Medical Center, jointly sponsored by the National Institute for Occupational Safety and Health, National Cancer Institute, and the National Institute of Environmental Health Sciences, and planned in consultation with the Scientific Committee on the Toxicology of Metals of the Permanent Commission and International Association on Occupational Health, was held March 24-28, 1980, in Atlanta, Georgia, to evaluate the present state of scientific knowledge concerning metal carcinogenicity and to seek underlying principles for mechanisms of metal carcinogen action in relation to public health. Metal carcinogenesis is considered an important area of health research due to the ubiquity of human exposure under occupational and/or environmental circumstances, and the persistence of metallic carcinogenic compounds in the environment.

The Workshop was attended by 54 experts from 11 countries, including Belgium, Canada, Denmark, Finland, France, Japan, the Netherlands, Norway, Sweden, the United Kingdom, and the United States, who formulated recommendations for future research on compounds of arsenic, beryllium, cadmium, chromium, nickel, and other metals and their compounds. During the course of the meeting, the group considered the history of cancer related to metals as well as reviews of data from epidemiological, animal bioassay, and *in vitro* studies. Data from these studies were evaluated in relation to the known chemistry and biochemical effects of metal compounds. Participants were divided into five working subgroups concerned with: Introduction and General Findings, Epidemiology, Animal Bioassays, Chemistry, and Cellular Mechanisms. Reports generated by these groups formed the basis for general conclusions on metals of carcinogenic concern.

The carcinogenicities of arsenic, chromium, and nickel compounds were again reviewed and agreed upon. In addition, the aggregate of consistently positive findings from several epidemiological studies on workers exposed to cadmium or beryllium compounds combined with experimental observations led meeting participants to conclude that acceptable evidence now exists to regard some of these compounds as contributing to the development of cancer in man.

The participants concluded that evaluation of carcinogenic effects for metallic carcinogens were greatly hindered by the lack of data on exposure to these substances in both the occupational and general environment and it was therefore strongly recommended that monitoring programs be planned and implemented to assess human exposure.

The participants also recognized that human exposure situations in both the work and general environment are frequently complex and that studies of single metal compounds are frequently insufficient for cancer risk assessment since concomitant exposure to other carcinogenic or cocarcinogenic substances, as well as their specific chemical forms, must also be evaluated.

Detailed recommendations for future studies were developed in each of the Workshop Groups.

*The Chief Editor was Sidney Belman (New York University Medical Center), with the assistance of Gunnar Nordberg, under the general guidance of an editorial committee composed of: Sidney Belman, Maths Berlin, Thomas Clarkson, Sir Richard Doll, Lars Friberg, Robert A. Goyer, Trent Lewis, Arthur E. Martell, Norton Nelson, Gunnar F. Nordberg, and Umberto Saffiotti.

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